

TRIGONOMETRY

Third Quarter Project

Due Date: 3-28-11 (extra credit if turned in by 3-25-11)
10 point deduction for each day late

Pick and choose your project.

- ☉ Each problem is worth up to 25 points.
- ☉ Please include a detailed explanation of your solution.
- ☉ A maximum of 100 points can be earned for this project
(any points above will convert to 100).

Problem # 1: Greek Speak

See attached paper.

On a separate piece of notebook paper, translate each of the 5 phrases from Greek to English. Also supply your own **historical** quote (at least 5 words) and cite the author.

Handwrite your quote in English and Greek Speak.

Problem # 2: Movie Theater Screen

See attached paper.

Show all work and include how you would enter everything into your calculator.

Problem # 3: "Teach me how..."

Create a slide show (minimum 5 slides) that teaches a topic we have studied this year.

You need to include every step of the process for the topic you choose. **You must have teacher approval of your topic before you even begin this choice.**

Problem # 4: Solving trig. equations in words

Explain in your own words how you would use your calculator to solve

$$\sin x = 0.3, \quad 0 \leq x < 2\pi$$

Solve the equation, include all solutions. Then, explain how you would modify your approach to solve

$$\cot x = 5, \quad 0 \leq x < 2\pi$$

Again, solve the equation for all solutions.

Problem # 5: Solve the Right Triangle

The hypotenuse of a right triangle is 3 feet. One leg is one foot. Solve the triangle, all angles should be in degrees. Be sure to include a detailed solution, along with a drawing of the triangle.

Problem # 6: Mach Number of an Airplane

See attached paper.

Answer all parts to receive full credit. Show all work and include how you would enter information into your calculator.

Problem # 1

Greek Speak

The 24 letters of the Greek alphabet are listed below, and many look or sound like the letters in the English alphabet. Look at the list for a short while and then try to read the quotations below. You will find each translation easier than the last.

α	alpha	ι	iota	ρ	rho
β	beta	κ	kappa	σ	sigma
γ	gamma	λ	lambda	τ	tau
δ	delta	μ	mu	υ	upsilon
ε	epsilon	ν	nu	φ	phi
ζ	zeta	ξ	xi	χ	chi
η	eta	ο	omicron	ψ	psi
θ	theta	π	pi	ω	omega



1. ευρεκα!

—Archimedes, 287–212 B.C.

2. ρεασον ισ ιμμορταλ, αλλ ελσε μορταλ.

—Pythagoras, 582–500 B.C.

3. θερε αρε ιν φαχτ τωο θινγς, ψλενσε ανδ οπινιον; θε φορμερ βεγετς κνωωλεδγε, θε λαττερ ιγνορανχε.

—Hippocrates, 4607–377 B.C.

4. υνδερ α στονε λυρκς α πολιτιχιαν.

—Aristophanes, 450–385 B.C.

5. α γρατ οξ στανδς ον μι τονγυε.

—Aeschylus, 525–456 B.C.

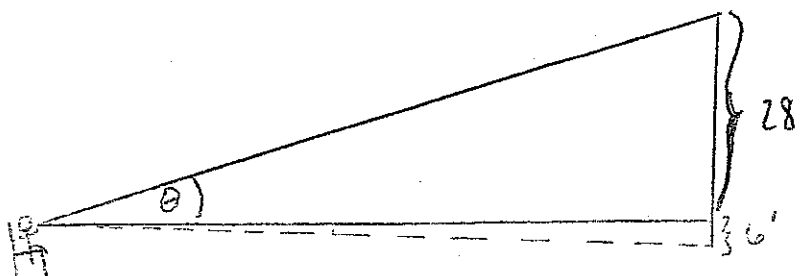
6. Supply your own historical quote (at least 5 words) in English and translate into Greek Speak.
(Be sure to cite your quote)

Problem #2

Suppose that a movie theater has a movie screen that is 28 feet tall. When you sit down, the bottom of the screen is 6 feet above your eye level. The angle formed by drawing a line from your eye to the bottom of the screen and your eye to the top of the screen is called the viewing angle. In the figure θ is the viewing angle. Suppose that you sit x feet from the screen. The viewing angle is given by the function

$$\theta(x) = \tan^{-1}\left(\frac{34}{x}\right) - \tan^{-1}\left(\frac{6}{x}\right)$$

- a) What is your viewing angle if you sit 10 feet from the screen? 15 feet? 20 feet?
- b) If there is 5 feet between the screen and the first row of seats and there is 3 feet between each row, which row results in the optimal viewing angle?



Problem # 6

The Mach number of an airplane is the ratio of its speed to the speed of sound. When an airplane travels faster than the speed of sound, the sound waves form a cone behind the airplane. The mach number is related to the apex angle θ of the cone by

$$\sin \frac{\theta}{2} = \frac{1}{M}$$

- a) Find the angle θ that corresponds to a mach number of 1.
- b) Find the angle θ that corresponds to a mach number of 4.5.
- c) Speed of sound is about 760 miles per hour. Determine the speed of an object with the mach numbers from parts a) and b).
- d) Rewrite the equation in terms of θ .

